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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/989,024	11/21/2001	Hirofumi Takikawa	216362US2	9602

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EXAMINER

RAO, SHRINIVAS H

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 05/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/989,024

Applicant(s)

TAKIKAWA ET AL.

Examiner

Steven H. Rao

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 March 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) 14-17 and 23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-13 and 18-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-23 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 November 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Priority

Receipt is acknowledged of paper submitted under 35 U.S.C. 119(a)-(d), claiming priority from Japanese Patent Application No. 2000-353659 filed on November 21, 2000 which papers have been placed of record in the file.

Drawings

The drawings filed on November 21, 2001 have been objected to by the draftsman for the reasons listed in the enclosed PTO-948. Appropriate correction is required.

Election/Restrictions

Claims 14-17 & 23 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected group, there being no allowable generic or linking claim.

Applicant timely traversed the restriction (election) requirement in Paper No.4. However Applicants' arguments are not persuasive because The Office (Examiner) will have the undue burden of having to examine two different classes (438 and 118) and the applicants' will not be burdened other paying fees which all applicants' have to pay.

Claim Objections

Claims 1-13 and 18 to 22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1 the phrase "air atmosphere " renders the claim indefinite because it is not clear what applicants' want to include/exclude by the recitation " air atmosphere".

It is suggested that Applicants' use either " air" or "ambient atmosphere" .

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 3 and 4 are rejected under 112 (2) paragraph.

In claim 3 the phrase, " holding said substrate on a cooling member " is indefinite.

In claim 4 the phrase," said nano-tube due to said predetermined region of said second electrode into said nanotube due to said arc discharge is carried out while surrounding at least said first electrode and an arc discharge region between said first electrode and said second electrode with a surrounding member ' is indefinite.

The claims appear to be literal translation from a Foreign language and replete with incorrect English language, terminology etc.

Applicants' cooperation is sought in correcting the claims to put them in condition for fulfilling all the requirements of U.S. practice and examination.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Cheng et al.
(U.S. Patent No. 6,517,800, herein after Cheng).

With respect to claim 1, to the extent understood, Cheng describes A method for manufacturing a nano-tube comprising the steps of: arranging a first electrode and a second electrode in a manner to be opposite to each other in an air atmosphere (Cheng col. 1 lines 54-55,58-60) , said second electrode being made of a material mainly consisting of a carbon material (col.1 lines 58-59 –graphite); applying a voltage between said first electrode and said second electrode to carry out arc discharge there between (Cheng col. 2 lines 1-4); and forming a carbon material on a predetermined region of said second electrode into a nano-tube due to said arc discharge (col.2 lines 25-30).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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Claims 2-13 and 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cheng et al. (U.S. Patent No. 6,517,800, herein after Cheng) as applied to claim 1 above and further in view of Apunevich et al. (U. S. Patent No. 6,156,994 herein after Apunevich).

With respect to claim 2, to the extent understood, Cheng describes a method as defined in claim 1.

Cheng does not specifically describe said first electrode is constituted by a torch electrode provided at an arc torch.

Apunevich in col.1 lines 34-35 and 40-42 describes the first electrode is constituted by a torch electrode provided at an arc torch to provide a method without the inconveniences associated with provision of an external inert-gas thereby providing a method with reduced costs, etc.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to include Apunevich's first electrode is constituted by a torch electrode provided at an arc torch in Chen's method steps to provide a method without the inconveniences associated with provision of an external inert-gas and thereby provide a method with reduced costs, etc. (Apunevich col. 1 lines 25-30).

The remaining limitations of claim 2 are :
said step of forming said carbon material on said predetermined region of said second electrode into said nano-tube due to said arc discharge is carried out while moving said torch electrode and second electrode relatively to each other (Chen col.3 lines 12-14).

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With respect to claim 3 to the extent understood, Cheng describes a method as defined in claim 1 or 2, wherein said second electrode is arranged on a surface of a substrate; and said step of forming said carbon material on said predetermined region of said second electrode into said nano-tube due to said arc discharge is carried out while holding said substrate on a cooling member to cool said substrate through said cooling member.

With respect to claim 4 to the extent understood, Cheng describes a method as defined in claim 1 or 2, wherein said step of forming said carbon material on said predetermined region of said second electrode into said nano-tube due to said arc discharge is carried out while surrounding at least said first electrode, said second electrode and an arc discharge region between said first electrode and said second electrode with a surrounding member. (Cheng col. 3 lines 5-7).

With respect to claim 5, to the extent Cheng describes a method as defined in claim 1 or 2, wherein said carbon material for said second electrode is any one selected from the group consisting of graphite, carbon, activated carbon, amorphous carbon and graphite. (Chen col.3 line 8).

With respect to claim 6 Chen describes a method as defined in claim 1 or 2, wherein said carbon material for said second electrode is any one selected from the group consisting of a carbon material containing a metal catalyst, that having a metal

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catalyst formed on a surface thereof, that containing B and a metal catalyst, that having B formed on a surface thereof and that having B and a metal catalyst formed on a surface thereof. (Chen col. 5 lines 4-6).

With respect to claim 7 Chen describes a method as defined in claim 6, wherein said metal catalyst is selected from the group consisting of Li, B, Mg, Al, Si, P, S, K, Ca, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, Ge, As, Y, Zr, Nb, Mo, Rh, Pd, In, Sri, Sb, La, Hf, Ta, W, Os, Pt, an oxide thereof, a nitride thereof, a carbide thereof, a sulfide thereof, a chloride thereof, a sulfate thereof, a nitrate thereof and a mixture thereof. (Chen col. 5 lines 4-6, Ni, Fe, Co, etc.).

With respect to claim 8 Chen describes a method as defined in any one of claims 1, 2 and 4, wherein said arc discharge is carried out while feeding specific gas to a region in which said arc discharge is generated. (Chen col. 5 lines 19-21).

With respect to claim 9 Chen describes a method as defined in claim 8, wherein said specific gas is selected from the group consisting of rare gas such as Ar, He or the like, air, nitrogen gas, carbon dioxide gas, oxygen gas, hydrogen gas and a mixture thereof. (Chen claim 7, etc.).

With respect to claim 10 Chen describes a method as defined in claim 1 or 2, wherein said first electrode is made of a material mainly consisting of graphite, activated carbon and amorphous carbon. (Chen col.3 line 8).

With respect to claim 11, Chen describes a method as defined in claim 1 or 2, wherein said arc discharge is generated by a DC or a DC pulse; and said second electrode acts as an anode for said arc discharge. (Chen col. 3 lines 24-26)

With respect to claim 12 Chen describes a method as defined in claim 2, wherein said arc discharge is generated by an AC or an AC pulse.

With respect to claim 18. Chen describes a method for patterning a nano-tube, comprising the steps of: arranging a first electrode and a second electrode in a manner to be opposite to each other in an air atmosphere (Cheng col. 1 lines 54-55,58-60), said second electrode being made of a material mainly consisting of a carbon material; (col.1 lines 58-59 –graphite); applying a voltage between said first electrode and said second electrode to generate arc discharge there between; (Cheng col. 2 lines 1-4);and forming a carbon material on a predetermined region of said second electrode into a nano-tube due to said arc discharge while moving said first electrode and second electrode relatively to each other. (col. 1 lines 58-59 –graphite);

With respect to claim 19 Chen describes a method for patterning a nano-tube, comprising the steps of:

arranging a first electrode and a second electrode in a manner to be opposite to each other in an air atmosphere, (Cheng col. 1 lines 54-55,58-60), said second electrode being made of a material mainly consisting of a carbon material selected from the group consisting of a carbon material formed into any pattern-like shape, (col.1

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lines 58-59 –graphite); that containing a metal catalyst formed into any pattern-like shape and that having a metal catalyst formed into any pattern-like shape on a surface thereof, (Cheng col. 3 lines 5-10) applying a voltage between said first electrode and said second electrode to generate arc discharge there between; ; (Cheng col. 2 lines 1-4); and forming a carbon material on a predetermined region of said second electrode into a nano-tube (col.1 lines 58-59 –graphite);

With respect to claim 20 Cheng describes a method for patterning a nano-tube, comprising the steps of: arranging a first electrode and a second electrode in a manner to be opposite to each other in an air atmosphere; (Cheng col. 1 lines 54-55,58-60), arranging a mask of any opening pattern on a surface of said second electrode; (Cheng col. 3 lines 5-10) applying a voltage between said first electrode and said second electrode to generate arc discharge there between; (Cheng col. 2 lines 1-4); and forming a carbon material on a predetermined region of said second electrode corresponding to openings of said mask into a nano-tube. (col.1 lines 58-59 –graphite);

With respect to claim 21 Cheng describes a method as defined in any one of claims 18 to 20, wherein said first electrode is constituted by a torch electrode provided at an arc torch. (Apunevich figure 1).

With respect to claim 22 Cheng describes a nano-tube material patterned according to the method defined in any one of claims 18 to 21. (Chen and Apunevich- see claims 1 to 18 above).

With respect to claim 23 Cheng describes an electron emission source having the patterned nano-tube material defined in claim 22 incorporated therein. (Chen col.3 lines 10-15).


Any inquiry concerning this communication or earlier communication from the examiner should be directed to Steven H. Rao whose telephone number is (703) 306-5584. The examiner can normally be reached on Monday- Friday from approximately 7:00 a.m. to 5:30 p.m.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0956. The Group facsimile number is (703) 308-7724.


Steven H. Rao

Patent Examiner

April 23, 2003.


LONG PHAM
PRIMARY EXAMINER